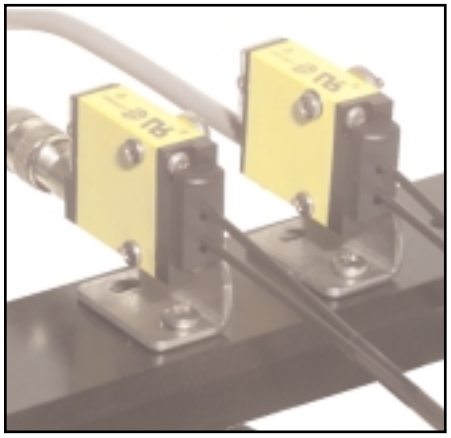
MINI-BEAM® Plastic Fiber Optic Sensors

Self-contained DC-operated Sensors for use with Banner Plastic Fiber Optics

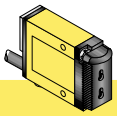


MINI-BEAM Plastic Fiber Optic Sensor Features

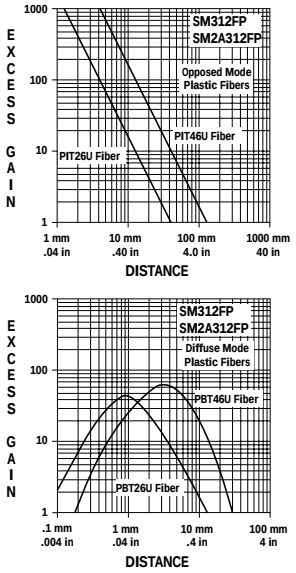
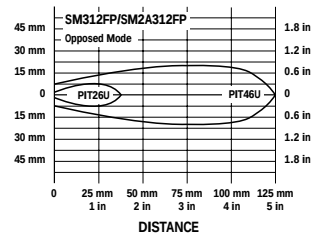
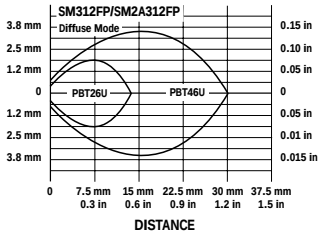
- Compact, modulated, self-contained visible red fiber optic sensors for 10-30V dc operation
- Useable in opposed and diffuse fiber optic modes with Banner plastic fiber optic assemblies
- Switch-selectable for light operate or dark operate
- Includes Banner's *exclusive*† AID™ alignment system
- Highly-repeatable 1 millisecond response
- Both sourcing and sinking outputs (150 mA max. each); continuous overload and short-circuit protected
- Rugged, epoxy-encapsulated construction: meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12 and 13; IEC IP67

†U.S. Patent 4356393

Visible red, 650 nm



MINI-BEAM Plastic Fiber Optic Models

Models*	Range	Cable**	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
SM312FP **SM312FPQD**	Range varies by sensing mode and fiber optics used	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP	 	 

* 9 m (30') cables are available by adding suffix **"W/30"** to the model number of any cabled sensor (e.g., **SM312FP W/30**). A 150 mm (6") long pigtail cable with attached QD connector is available by adding suffix **"QDP"** to the model number of any MINI-BEAM sensor (e.g., **SM312FPQDP**). See page 4 for more information.

May be ordered with 0.3 millisecond ON/OFF response by adding suffix "**MHS**" to the model number (e.g., **SM312FPMHS**). This modification reduces sensing range (and excess gain).

** A model with a QD connector or QD pigtail requires an accessory mating cable. See page 5 for more information.

MINI-BEAM Operation

The sensor's Gain adjustment and Light/Dark Operate switch are located under the gasketed acrylic cover. Loosen the screw to access these adjustments and use a small screwdriver to adjust.

Gain adjustment:

Turn clockwise to increase gain (sensitivity); 15-turn Gain potentiometer is clutched at both ends of travel.

Light/Dark operate selection:

- Turn switch *fully* clockwise for light operate (sensor outputs conduct when object is absent)
- Turn switch *fully* counterclockwise for dark operate (sensor outputs conduct when object is present)

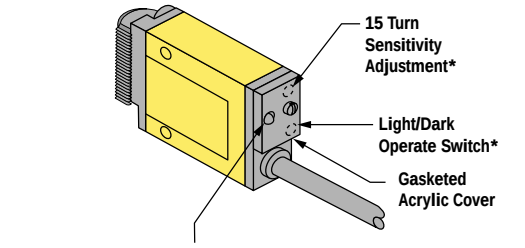

15 Turn
Sensitivity
Adjustment*
Light/Dark
Operate Switch*
Gasketed
Acrylic Cover
"AID" Indicator LED Lights when the sensor sees its own modulated light and pulses at a rate proportional to the strength of the received light signal.
*Under acrylic cover

Figure 1. MINI-BEAM Plastic Fiber Optic sensor features

Unterminated Plastic Fiber Cutting Procedure

Unterminated plastic fibers are designed to be cut by the user to the length required for the application. To facilitate cutting, a Banner model PFC-1 cutting device is supplied with the fiber. Cut the fiber as follows:

1) Locate the "control end" of the fiber (the unfinished end). Determine the length of fiber required for the application. If using a bifurcated fiber, separate the two halves of the fiber at least 2" beyond the fiber cutting location. Lift the top (blade) of the cutter to open the cutting ports. Insert one of the control ends through one of the cutting ports on the PFC-1 cutter so that the excess fiber protrudes from the back of the cutter.

2) Double-check the fiber length, and close the cutter until the fiber is cut. Using a different cutting port, cut the second control end to the required length. **To ensure a clean cut each time, do not use a cutting port more than once.**

3) Gently wipe the cut ends of the fiber with a clean, dry cloth to remove any contamination. **Do not use solvents or abrasives on any exposed optical fiber.**

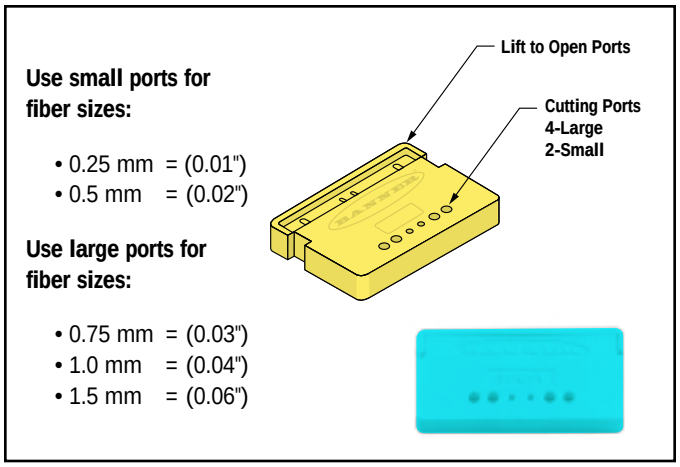

Use small ports for fiber sizes:
• 0.25 mm = (0.01")
• 0.5 mm = (0.02")
Use large ports for fiber sizes:
• 0.75 mm = (0.03")
• 1.0 mm = (0.04")
• 1.5 mm = (0.06")
Lift to Open Ports
Cutting Ports
4-Large
2-Small

Figure 2. PFC-1 plastic fiber cutter (supplied with fiber)

MINI-BEAM Fiber Installation

1) Unlock the fiber gripper as shown in figure 3. If 0.25 mm or 0.5 mm core fibers are being used, insert the small fiber adapter into the ports.

2) Gently insert the prepared plastic fiber ends into the ports, as far as they will go.

3) Slide the fiber gripper in to lock, as shown in figure 3.

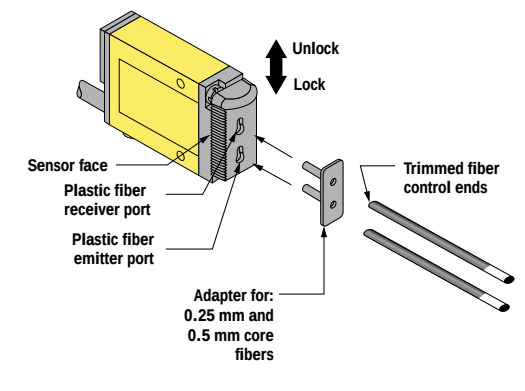


Figure 3. Installing fibers into the MINI-BEAM Plastic Fiber Optic sensor

Banner Engineering Corp. • Minneapolis, U.S.A.
Website: http://www.baneng.com • Tel: 888.373.6767

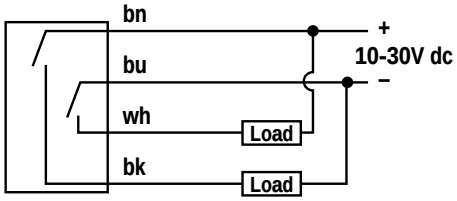
MINI-BEAM DC Plastic Fiber Optic Sensor Specifications

Supply Voltage and Current	10 to 30V dc (10% maximum ripple) at less than 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor
Output Rating	150mA maximum each output at 25°C, derated to 100 mA at 70°C (derate ≈1 mA per °C) **Off-state leakage current** less than 1 microamp **Output saturation voltage** (PNP output) less than 1 volt at 10 mA and less than 2 volts at 150 mA **Output saturation voltage** (NPN output) less than 200 millivolts at 10 mA and less than 1 volt at 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Output Response Time	Sensors will respond to either a "light" or a "dark" signal of 1 millisecond or longer duration, 500 Hz max. 0.3 millisecond response modification is available. See note below. 100 millisecond delay on power-up; outputs do not conduct during this time. NOTE: DC MINI-BEAMs may be ordered with 0.3 millisecond ON/OFF response by adding suffix “MHS” to the model number (e.g., SM312FPMHS). This modification reduces sensing range (and excess gain).
Repeatability	0.3 milliseconds. Response time and repeatability specifications are independent of signal strength.
Adjustments	Light/Dark Operate select switch, and 15-turn slotted brass screw Gain (sensitivity) adjustment potentiometer (clutched at both ends of travel). Both controls are located on rear panel of sensor and protected by a gasketed, clear acrylic cover.
Indicators	Exclusive, patented Alignment Indicating Device system (AID™, US patent #4356393) lights a rear-panel mounted red LED indicator whenever the sensor sees a "light" condition, with a superimposed pulse rate proportional to the light signal strength (the stronger the signal, the faster the pulse rate).
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring sealing, acrylic lenses, and stainless steel screws.
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12, and 13; IEC IP67
Connections	PVC-jacketed 4-conductor 2 m (6.5') or 9 m (30') cables, 4-pin Euro-style quick-disconnect (QD) fitting or 150 mm (6") pigtail are available. QD cables are ordered separately. See page 5.
Operating Conditions	**Temperature:** -20° to +70°C (-4° to +158°F) **Maximum relative humidity:** 90% at 50°C (non-condensing)
Application Notes	The NPN (current sinking) output of dc MINI-BEAM sensors is directly compatible as an input to Banner logic modules, including all non-amplified MAXI-AMP and MICRO-AMP modules. MINI-BEAMs are TTL compatible.
Certifications	CE CSA® ®

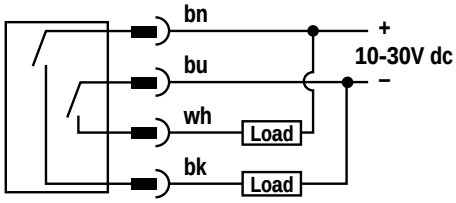
MINI-BEAM® Plastic Fiber Optic Sensors – DC Models

MINI-BEAM DC Plastic Fiber Optic Sensor Hookups

DC Sensors with Attached Cable

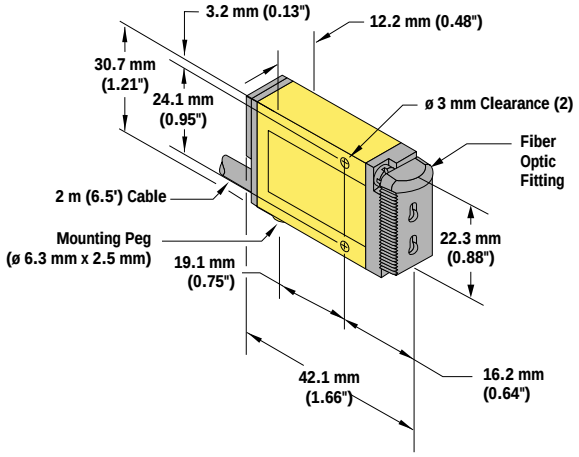


DC Sensors with Quick-Disconnect (4-Pin Euro-Style)

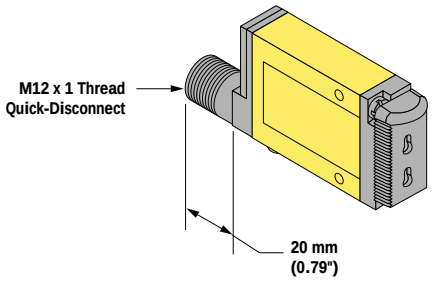


MINI-BEAM DC Plastic Fiber Optic Sensor Dimensions

MINI-BEAM Models with Integral Cable



MINI-BEAM Models with Quick-Disconnect



Accessories

MINI-BEAM Modifications

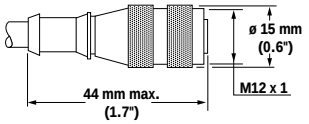
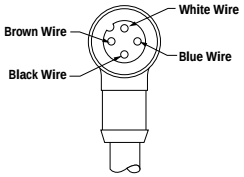
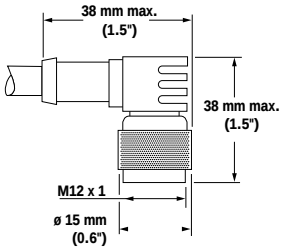
Model Suffix	Modification	Description	Example of Model Number
W/30	9 m (30') cable	All MINI-BEAM sensors may be ordered with an integral 9 m (30') cable in place of the standard 2 m (6.5') cable	SM312FP W/30
MHS	Modified for High Speed	Standard dc MINI-BEAM sensors with 1 millisecond output response may be modified for 0.3 millisecond (300 µs) response. NOTE: Faster response comes at the expense of lower excess gain. Also, operating temperature range becomes -20° to +50°C (-4° to +122°F).	SM312FPMHS
QDP	Pigtail Quick-Disconnect	All MINI-BEAMs may be built with a 150 mm (6") long integral cable, terminated with the appropriate QD connector.	SM312FPQDP

Extension Cables (without connectors)

The following cables are available for extending the length of existing sensor cable. These are 30 m (100') lengths of MINI-BEAM cable. This cable may be spliced to existing cable. Connectors, if used, must be user-supplied.

Model	Type	Used with:
EC312-100	4-conductor	All MINI-BEAM SM312 dc models

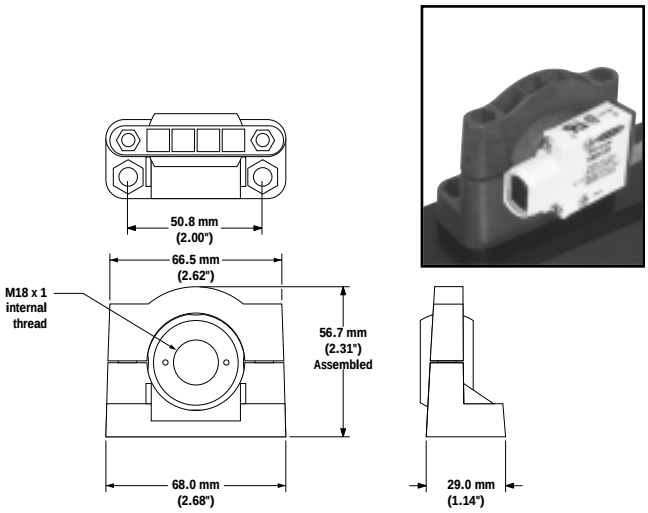
Quick-Disconnect Cables

Style	Model	Length	Dimensions	Pin-out
4-Pin Euro-style Straight	**MQDC-406** **MQDC-415** **MQDC-430**	2 m (6.5') 5 m (15') 9 m (30')		
4-Pin Euro-style Right-angle	**MQDC-406RA** **MQDC-415RA** **MQDC-430RA**	2 m (6.5') 5 m (15') 9 m (30')		

Mounting Brackets

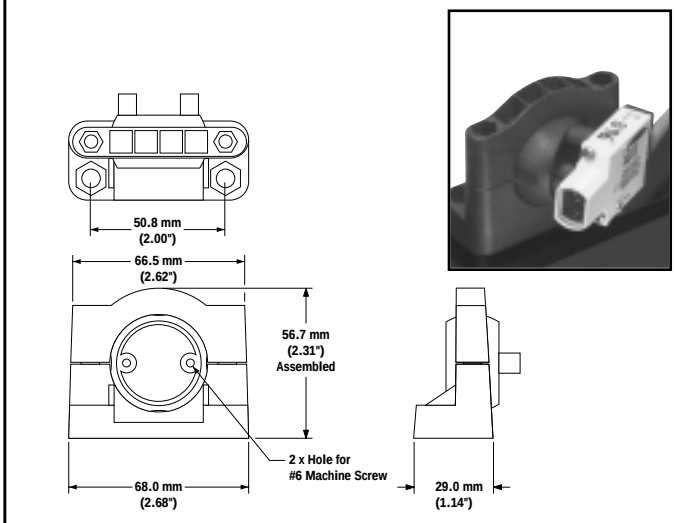
SMB3018SC

- 18 mm swivel side-mount bracket
- Black thermoplastic polyester



SMB3018SUS

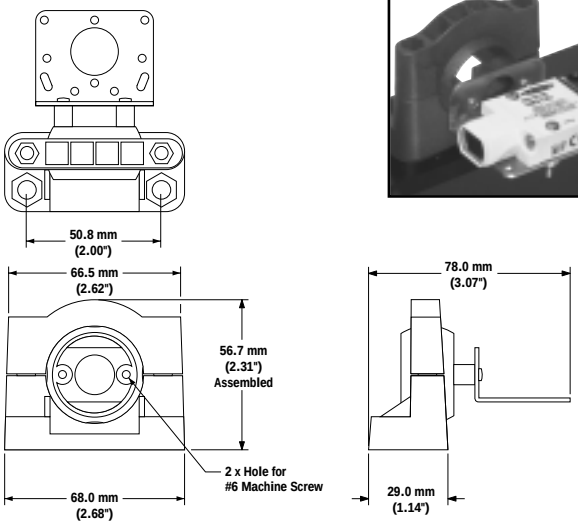
- Side-mount swivel bracket – extended range of motion
- Black thermoplastic polyester



Mounting Brackets

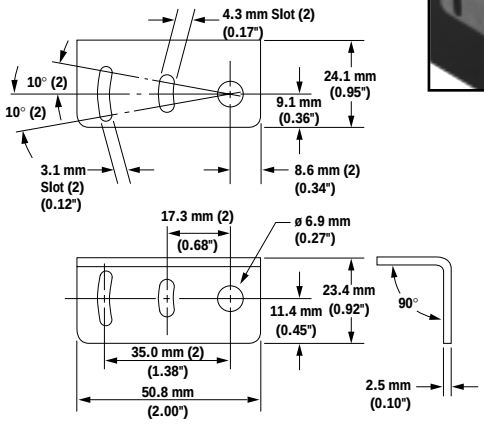
SMB30SK

- Flat-mount swivel bracket with extended range of motion
- Black reinforced thermoplastic polyester and 316 stainless steel



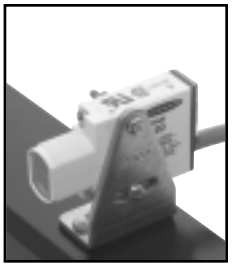
SMB312B

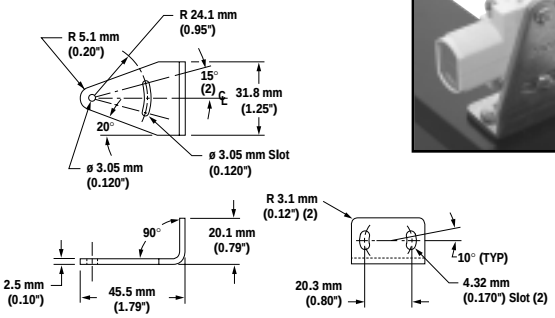
- Stainless steel
- 2-axis, side-mount bracket



SMB312S

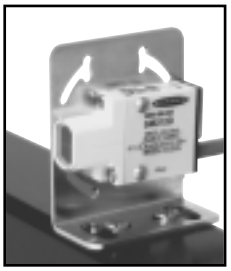
- Stainless steel, 2-axis, bottom-mount bracket
- Includes mounting foot

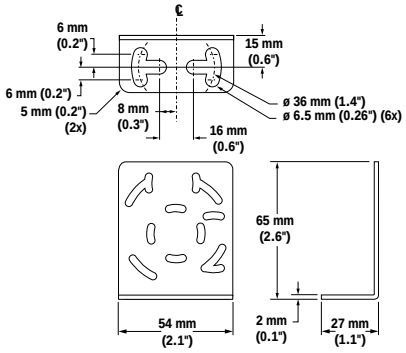




SMB46L

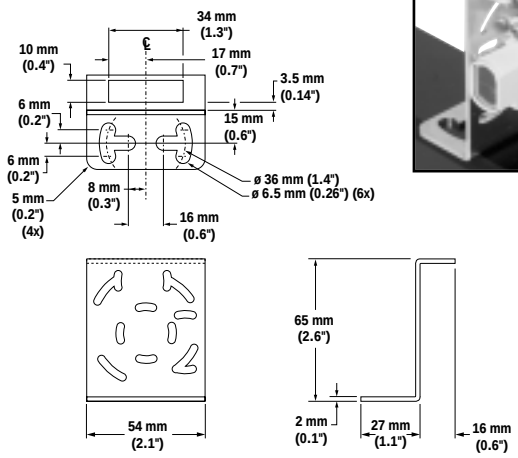
- "L" bracket
- 14 ga 316 stainless steel

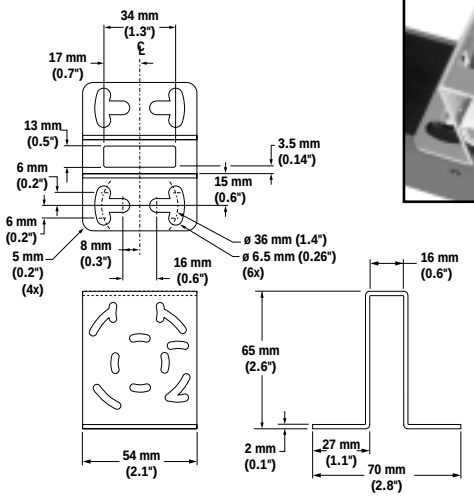




Mounting Brackets

SMB46S	• "S" bracket • 14 ga 316 stainless steel	**SMB46U**	• "U" bracket • 14 ga 316 stainless steel





MINI-BEAM® Plastic Fiber Optic Sensors – DC Models

the photoelectric specialist

WARNING . . . Not To Be Used for Personnel Protection

Never use this product as a sensing device for personnel protection. Doing so could lead to serious injury or death.

This product does NOT include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products which meet OSHA, ANSI and IEC standards for personnel protection.

WARRANTY: Banner Engineering Corp. warrants its products to be free from defects for one year. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.

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